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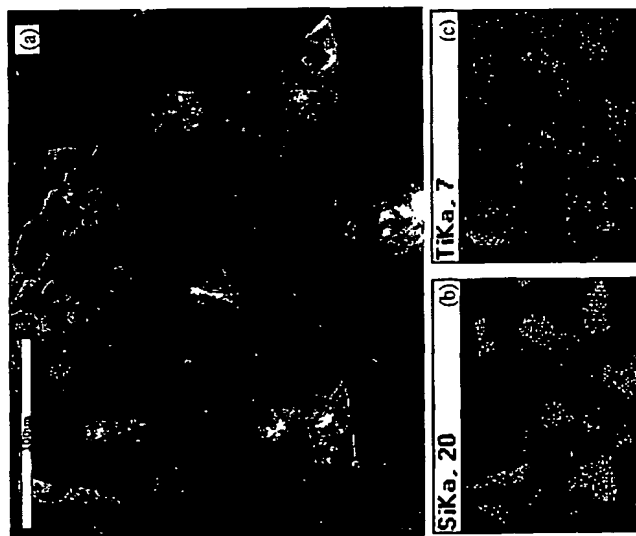
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(54) Title: METHOD AND A COMPOSITE FOR MERCURY CAPTURE FROM FLUID STREAMS



(57) Abstract: A method for removing mercury from a fluid stream includes the steps of providing a porous composite material comprising a substrate and a plurality of catalyst and/or photocatalyst particles, and contacting substrate with a fluid stream. The porous composite material adsorbs and/or then oxidizes or reduces metallic species including elemental mercury. A fossil fuel fired power plant can include an emission control device comprising the porous composite material to filter flue gas to and thereby mini-  
mize mercury emissions into the environment.

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GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/06597

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC(7) : B01D 15/00; B01J 21/08; C02F 1/28, 1/72<br>US CL : 210/670, 679, 688, 748, 763, 914; 502/242, 250<br>According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                     |                                                                                                                                                                                                                                              |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>U.S. : 210/670, 679, 688, 721, 748, 763, 914; 502/239, 242, 250<br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                     |                                                                                                                                                                                                                                              |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 4,946,596 A (FURUTA et al.) 07 August 1990, entire document.</td> <td>1-3, 8 and 9</td> </tr> <tr> <td>---</td> <td></td> <td></td> </tr> <tr> <td>Y</td> <td></td> <td>4, 5 and 11-14</td> </tr> <tr> <td>X</td> <td>US 4,786,483 A (AUDEH) 22 November 1988, col. 1, lines 51 and 54.</td> <td>15, 22 and 24</td> </tr> <tr> <td>---</td> <td></td> <td></td> </tr> <tr> <td>Y</td> <td></td> <td>23</td> </tr> <tr> <td>X</td> <td>US 3,925,247 A (OGURA et al.) 09 December 1975, col. 2, lines 53, 54, 62 and 63.</td> <td>15-17 and 24</td> </tr> <tr> <td>---</td> <td></td> <td></td> </tr> <tr> <td>Y</td> <td></td> <td>23</td> </tr> <tr> <td>Y</td> <td>US 6,013,187 A (BURNS et al.) 11 January 2000, entire document.</td> <td>4, 5, 20 and 21</td> </tr> <tr> <td>A, P</td> <td>US 6,632,771 B1 (MAEKAWA et al.) 14 October 2003, entire document.</td> <td>10 and 19</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                     |                                                                                                                                                                                                                                              | Category *                               | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | X   | US 4,946,596 A (FURUTA et al.) 07 August 1990, entire document.                                      | 1-3, 8 and 9                                                                                                                                                                                    | --- |                                                                                   |     | Y   |                                                                                                                                                                     | 4, 5 and 11-14                                                                                                                                                           | X   | US 4,786,483 A (AUDEH) 22 November 1988, col. 1, lines 51 and 54.        | 15, 22 and 24 | --- |                                                                                                    |                                                                                                                                                                                                                                              | Y |  | 23    | X | US 3,925,247 A (OGURA et al.) 09 December 1975, col. 2, lines 53, 54, 62 and 63. | 15-17 and 24                              | --- |  |  | Y |  | 23 | Y | US 6,013,187 A (BURNS et al.) 11 January 2000, entire document. | 4, 5, 20 and 21 | A, P | US 6,632,771 B1 (MAEKAWA et al.) 14 October 2003, entire document. | 10 and 19 |
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| A, P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 6,632,771 B1 (MAEKAWA et al.) 14 October 2003, entire document.                                                                                                  | 10 and 19                                                                                                                                                                                                                                    |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                     |                                                                                                                                                                                                                                              |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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| * Special categories of cited documents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     | *T*                                                                                                                                                                                                                                          |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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| *E*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | earlier application or patent published on or after the international filing date                                                                                   | *X*                                                                                                                                                                                                                                          |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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| *P*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | document published prior to the international filing date but later than the priority date claimed                                                                  | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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| Date of the actual completion of the international search<br>18 October 2004 (18.10.2004)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                     | Date of mailing of the international search report<br><b>27 OCT 2004</b>                                                                                                                                                                     |                                          |                                                                                    |                       |     |                                                                                                      |                                                                                                                                                                                                 |     |                                                                                   |     |     |                                                                                                                                                                     |                                                                                                                                                                          |     |                                                                          |               |     |                                                                                                    |                                                                                                                                                                                                                                              |   |  |       |   |                                                                                  |                                           |     |  |  |   |  |    |   |                                                                 |                 |      |                                                                    |           |
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